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DEPARTMENTS.

SOLUTIONS OF PROBLEMS.

ARITHMETIC.

112. Proposed by G. B. M. ZERR, A.M., Ph.D., Professor of Mathematics and Science, Chester High School, Chester, Pa.

The cost of an article is $\$4.\frac{.\dot{2}9\dot{7}}{1.003}$. The selling price is $\$6.\frac{1000}{33337}$. What is the gain % ?

II. Solution by JOHN M. HOWIE, Professor of Mathematics, The Nebraska State Normal, Peru, Neb.

In the solution of the above in the August-September MONTHLY by Professors Schmitt and Zerr, the following statements are made :

$$.\dot{2}9\dot{7}=\tfrac{297}{999}=\tfrac{11}{37};\ 1.00\dot{3}=1\tfrac{1}{300}=\tfrac{301}{300}.\quad \tfrac{11}{37}\div\tfrac{301}{300}=\tfrac{3300}{11137};\ .\tfrac{3300}{11137}=\tfrac{330}{11137}.$$

It seems to me the statements are inconsistent.

$$\text{If } .\tfrac{3300}{11137}=\tfrac{300}{11137} \text{ then also } .\dot{2}9\dot{7}=.\tfrac{297}{999}=.\tfrac{11}{37}=\tfrac{11}{370}.$$

But if $.\dot{2}9\dot{7}=\frac{297}{999}=\frac{11}{37}$, then $.\frac{3300}{11137}=\frac{3300}{11137}$.

The latter I think to be correct.

The following solution seems to me to be correct :

$$.\dot{2}9\dot{7}=.\tfrac{297}{999}=.\tfrac{11}{37}=\tfrac{11}{37};\ 1.00\dot{3}=1\tfrac{1}{300}=\tfrac{301}{300}.\quad \tfrac{11}{37}\div\tfrac{301}{300}=\tfrac{3300}{11137};\ .\tfrac{3300}{11137}=\tfrac{3300}{11137}.$$

$$\therefore\ \$4.\frac{.\dot{2}9\dot{7}}{1.003}=\$4\tfrac{3300}{11137}=\$\tfrac{47848}{11137}=\text{cost price.}$$

$$\$6.\tfrac{1000}{33337}=\$6\tfrac{1000}{33337}=\$\tfrac{201022}{33337}=\text{selling price.}$$

$$\therefore\ \$\tfrac{201022}{33337}-\$\tfrac{47848}{11137}=\$\tfrac{1739\,6574}{1003\,4437}=\text{gain.}$$

$$\tfrac{1739\,6574}{1003\,4437}\div\tfrac{47848}{11137}=.40\tfrac{19019\,35}{5388881}=40\tfrac{19019\,35}{5388881}\%=\text{gain per cent.}$$

117. Proposed by MARCUS BAKER, U.S. Coast and Geodetic Survey, 1905 Sixteenth St., Washington, D.C.

A landed man two daughters had,
And both were very fair;
He gave to each a piece of land,
One round, the other square.

At twenty shillings an acre, just,
Each piece its value had;
The shillings that did compass each,
For it exactly paid.

If 'cross a shilling be an inch,
(As it is, very near),
Which had the larger portion, she
That had the round or square?

Also, how many acres did each receive?
[Does anyone know the history of this problem?]

I. Solution by G. B. M. ZERR, A. M., Ph. D., Professor of Mathematics and Science, Chester High School, Chester, Pa., and ELMER SCHUYLER, Reading, Pa.

Let r=radius of circle, x=side of square, both in rods.

In this solution we regard the shillings on the perimeter of the circle as tangent at the extremities of their diameters.

$$\therefore \frac{20\pi r^2}{160}=2\pi r\times 16\tfrac{1}{2}\times 12.$$

$$\therefore r=3068 \text{ rods}; \frac{\pi r^2}{160}=184816.87224 \text{ acres}.$$

$$\frac{20x^2}{160}=4x\times 16\tfrac{1}{2}\times 12.$$

$$\therefore x=6336 \text{ rods}; \frac{x^2}{160}=250905.6 \text{ acres}.$$

II. Solution by D. G. DORRANCE, Jr., Camden, N. Y.

(1) Let $2\pi R=x$=number of inches in circumference of circular parcel, and (2) $\pi R^2=x/20$ acres$=313632x$ square inches.

From (1), $R=\frac{x}{2\pi}$, or $R^2=\frac{x^2}{4\pi^2}$.

From (2), $R^2=\frac{313632x}{\pi}$. Then $\frac{x^2}{4\pi^2}=\frac{313632x}{\pi}$.

Whence $x=313632(4\pi)=3941225.1648$ inches in circumference.

$x/20=197061.25824$, number of acres in circular parcel.

(1) Let $4y=x$=number of inches around the square.

(2) Let $y^2=x/20$ acres$=313632x$ square inches.

From (1), $y=x/4$, or $y^2=x^2/16$.

From (2), $y^2=313532x$.

Then $x^2/16=313632x$.

Whence $x=5018112$. $x/20=250905.6$=number of acres in square parcel.

118. Proposed by J. F. TRAVIS, Student in Ohio State University, Columbus, Ohio.

The present worth of a note due January 1, 1896, was \$74,200, when discounted at 4% true discount. The present worth of another note, due July 1, 1896, whose face value was the same as that of the first note, was \$68,900 when discounted at 8% true discount. Find the face of the notes and the date when given, supposing the second note to have been given the same day the first note was. Solve by arithmetic.

I Solution by G. B. M. ZERR, A. M., Ph. D., Professor of Mathematics and Science, Chester High School, Chester, Pa.

Let F=face of each note, t=number of years before January 1, 1896, the notes were given.